

200G QSFP DD LR4 Optical Transceiver

Part Number: VQ-2CLR4CS-AA

VQ-2CLR4CS-AA is a high performance QSFP DD transceiver module for 200 Gigabit Ethernet data links over single-mode fiber.

Features

- QSFP-DD Multi-Source Agreement compliant
- Hot pluggable QSFP-DD footprint
- Supports 212.5Gbps Data Rate
- 4 x 26.5625GBd PAM4 Serial Electrical Interface (200GAUI-4)
- 8 x 26.5625Gbps NRZ Serial Electrical Interface (200GAUI-8)
- Dual LC Optical Interface
- 4 x LAN-WDM Transmitters
- 4 x PIN Receivers
- Built-in dual CDR
- Up to 10km Point-to-Point Transmission on Single Mode Fiber
- Operating temperature range 0°C to 70°C
- Power Dissipation < 10.8W
- Single +3.3V Power Supply
- QSFP-DD CMIS Rev 4.0

Applications

- 200GBASE-LR4

Ordering Information

Part Number	Data Rate	Link Length	Laser	Detector	Fiber Type	Temperature
VQ-2CLR4CS-AA	200G	10km over SMF	1310nm EML	1310nm PIN	SMF	0 – 70°C

Product Overview

Vitex **VQ-2CLR4CS-AA** is a high performance QSFP-DD transceiver module for 200 Gigabit Ethernet data links over a single mode fiber pair. The maximum reach is 10km. In the case of 200GAUI-8 electrical interface, an internal gearbox converts the 8 electrical input channels into four 25GBd PAM4 signals. The four transmitters are LAN-WDM lasers generating four optical 25GBd PAM4 output signals, which are multiplexed together at the optical output port.

The four receivers are PIN photodiodes which detect (after optical de-multiplexing) four 25GBd PAM4 optical input signals. In the case of 200GAUI-8 electrical interface, these 25GBd data streams are converted into eight 25Gbps electrical output signals by the gearbox.

This transceiver module is compliant with the QSFP-DD Multisource Agreement (MSA) and hot pluggable.

Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit
Power Supply Voltage	V_{CC}	3.135	3.3	3.465	V
Operating Case Temperature	T_c	0		70	°C
Baud Rate per Lane (PAM4)	f_d		26.5625		GBaud/s
Humidity	Rh			85	%
Power Dissipation	P_m			10.8	W
Power Supply Current	I_{CC}			3.12	A

Optical – Transmitter

Parameter	Symbol	Min	Typical	Max	Unit
Center Wavelength, Optical Lanes 0 to 3	λ_0	1294.53	1295.56	1296.59	nm
	λ_1	1299.02	1300.05	1301.09	
	λ_2	1303.54	1304.58	1305.63	
	λ_3	1308.09	1309.14	1310.19	
Link Length ¹⁻⁴				10	km
Signaling Rate, each Lane ⁵			26.5625		GBd
Aggregated Data Rate ⁵			212.5		Gbps
Total Average Output Power ⁶		2.6		11.3	dBm
Average Output Power, each Lane ^{6,7}		-3.4		5.3	dBm
Launched Outer OMA (OMA _{outer}), each Lane ^{6,8}		-0.4		5.1	dBm
Difference in launch power b/w any two Lanes (OMA _{outer})				4	dB
Launch power in OMA _{outer} minus TDECQ (each lane)	P _{tdecq}	-1.8 ^{6,9}			dBm
		-1.7 ^{6,10}			
Transmitter and dispersion eye closure (each lane)	TDECQ			3.4	dB
Extinction Ratio (each lane)	ER	3.5			dB

Note:

1. EOL over operating temperature range
2. 26.5625GBd, BER $\leq 2.4 \times 10^{-4}$, PRBS31Q, pre-FEC, each lane
3. The optical input to the receiver should not exceed this value. Transmitters must never be directly connected to receivers before ensuring that proper optical attenuation is used
4. Cabled optical fiber as per IEEE 802.3bs-2017
5. IEEE 802.3bs-2017
6. Output power coupled into a 9/125 μm single mode fiber
7. Average launch power, each lane (min) is informative and not the principal indicator of signal strength. A transmitter with launch power below this value cannot be compliant; however, a value above this does not ensure compliance
8. Even if the TDECQ < 1.4dB for an extinction ratio of $\geq 4.5\text{dB}$ or TDECQ < 1.3dB for an extinction ratio of < 4.5dB, the minimum OMA_{outer} must exceed -0.4dBm
9. Extinction ratio $\geq 4.5\text{dB}$
10. Extinction ratio < 4.5dB

Optical – Receiver

Parameter	Symbol	Min	Typical	Max	Unit
Operating Wavelength, Optical Lanes 0 to 3	λ_0	1294.53	1295.56	1296.59	nm
	λ_1	1299.02	1300.05	1301.09	
	λ_2	1303.54	1304.58	1305.63	
	λ_3	1308.09	1309.14	1310.19	
Average Receive Power (each lane) ¹¹	Pin	-9.7		5.3	dBm
Receiver Power (OMA _{outer}) (each lane)	OMA _{out}			5.1	dBm
Difference in Receive Power between any two Lanes (OMA _{outer})				4.2	dB
Receiver Sensitivity (OMA _{outer}) (each lane) ¹²	Sen			-7.7	dB
Stressed Receiver Sensitivity (OMA _{outer}) (each lane) ¹³	Sens			-5.2	dBm

Note:

11. Average receive power, each lane (min) is informative and not the principal indicator of signal strength. A received power below this value cannot be compliant; however, a value above this does not ensure compliance
12. Receiver sensitivity (OMA), each lane (max) is informative and is defined for a transmitter with SECQ of 0.9 dB
13. 26.5625GBd, BER $\leq 2.4 \times 10^{-4}$, PRBS31Q, pre-FEC, each lane

Electrical Connector Layout

Top side				Bottom side							
38	GND		76	GND			GND	39		GND	1
37	TX1n		75	TX5n			TX6n	40		TX2n	2
36	TX1p		74	TX5p			TX6p	41		TX2p	3
35	GND		73	GND			GND	42		GND	4
34	TX3n		72	TX7n			TX8n	43		TX4n	5
33	TX3p		71	TX7p			TX8p	44		TX4p	6
32	GND		70	GND			GND	45		GND	7
31	LPMODE		69	Reserved			Reserved	46		ModSelL	8
30	Vcc1		68	Vcc2			VS1	47		ResetL	9
29	VccTx		67	VccTx1			VccRx1	48		VccRx	10
28	IntL		66	Reserved			VS2	49		SCL	11
27	ModPrsL		65	NC			VS3	50		SDA	12
26	GND		64	GND			GND	51		GND	13
25	RX4p		63	RX8p			RX7p	52		RX3p	14
24	RX4n		62	RX8n			RX7n	53		RX3n	15
23	GND		61	GND			GND	54		GND	16
22	RX2p		60	RX6p			RX5p	55		RX1p	17
21	RX2n		59	RX6n			RX5n	56		RX1n	18
20	GND		58	GND			GND	57		GND	19

Legacy QSFP28 pads
Additional QSFP-DD pads
Additional QSFP-DD pads
Legacy QSFP28 pads

Electrical Pin Definition

Pin Number	Name	Function	Pin Number	Name	Function
1	GND	Ground	39	GND	Ground
2	TX2n	Transmitter Inverted Data Input	40	TX6n	Transmitter Inverted Data Input
3	TX2p	Transmitter Non-Inverted Data Input	41	TX6p	Transmitter Non-Inverted Data Input
4	GND	Ground	42	GND	Ground
5	TX4n	Transmitter Inverted Data Input	43	TX8n	Transmitter Inverted Data Input
6	TX4p	Transmitter Non-Inverted Data Input	44	TX8p	Transmitter Non-Inverted Data Input
7	GND	Ground	45	GND	Ground
8	ModSelL	Module Select	46	Reserved	For future use
9	ResetL	Module Reset	47	VS1	Module Vendor Specific 1
10	VccRx	+3.3V Power Supply Receiver	48	VccRx1	3.3V Power Supply
11	SCL	2-wire serial interface clock	49	VS2	Module Vendor Specific 2
12	SDA	2-wire serial interface data	50	VS3	Module Vendor Specific 3
13	GND	Ground	51	GND	Ground
14	RX3p	Receiver Non-Inverted Data Output	52	RX7p	Receiver Non-Inverted Data Output
15	RX3n	Receiver Inverted Data Output	53	RX7n	Receiver Inverted Data Output
16	GND	Ground	54	GND	Ground
17	RX1p	Receiver Non-Inverted Data Output	55	RX5p	Receiver Non-Inverted Data Output
18	RX1n	Receiver Inverted Data Output	56	RX5n	Receiver Inverted Data Output
19	GND	Ground	57	GND	Ground
20	GND	Ground	58	GND	Ground
21	RX2n	Receiver Inverted Data Output	59	RX6n	Receiver Inverted Data Output
22	RX2p	Receiver Non-Inverted Data Output	60	RX6p	Receiver Non-Inverted Data Output
23	GND	Ground	61	GND	Ground
24	RX4n	Receiver Inverted Data Output	62	RX8n	Receiver Inverted Data Output
25	RX4p	Receiver Non-Inverted Data Output	63	RX8p	Receiver Non-Inverted Data Output
26	GND	Ground	64	GND	Ground
27	ModPrsL	Module Present	65	NC	No Connect
28	IntL	Interrupt	66	Reserved	For future use
29	VccTx	+3.3V Power supply transmitter	67	VccTx1	3.3V Power Supply
30	Vcc1	+3.3V Power supply	68	Vcc2	3.3V Power Supply
31	LPMODE	Low Power Mode	69	Reserved	For future use
32	GND	Ground	70	GND	Ground
33	TX3p	Transmitter Non-Inverted Data Input	71	TX7p	Transmitter Non-Inverted Data Input
34	TX3n	Transmitter Inverted Data Input	72	TX7n	Transmitter Inverted Data Input
35	GND	Ground	73	GND	Ground
36	TX1p	Transmitter Non-Inverted Data Input	74	TX5p	Transmitter Non-Inverted Data Input
37	TX1n	Transmitter Inverted Data Input	75	TX5n	Transmitter Inverted Data Input
38	GND	Ground	76	GND	Ground

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